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(71) Applicant (for all designated States except US): GRAM A/S [DK/DK]; Aage Grams Vej 1, DK-6500 Vojens (DK).			
(72) Inventor; and			
(75) Inventor/Applicant (for US only): SIMONSEN, Kaj [DK/DK]; Præstevænget 8, DK-6500 Vojens (DK).			
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(54) Title: A MAGAZINE FOR A DISPENSER FOR CRISP AND FRAGILE CONTAINERS AND USES OF SUCH A MAGAZINE			
(57) Abstract			
<p>A magazine (1) is described for careful handling of waffles (3). The magazine comprises a duct on the waffles (3), which are placed within an elastically resilient membrane (7). The membrane (7) is situated on an internal tube (8) provided with slits (17). Outside an external tube (9) is provided. By supplying pressure to a closed chamber (12) between the external tube (9) and the membrane (7) the membrane is displaced from a first position, where it holds the waffles in a gentle way, to a second position, where it allows the free passage of the waffles through the internal tube (9).</p>			

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A MAGAZINE FOR A DISPENSER FOR CRISP AND FRAGILE CONTAINERS AND USES OF SUCH A MAGAZINE

The present invention relates to a magazine for a dispenser for crisp and fragile containers, for example cones for an icecream product, the dispenser comprising the magazine arranged for supporting a stack of containers as well as means for taking out
5 the lowermost container from the stack and inflatable means for supporting the other containers. Furthermore, the invention concerns specific uses of the magazine according to the invention.

The present invention has appeared in connection with handling of so-called cones,
10 which are crisp, fragile, cone-shaped waffles in icecream cornet products. The handling of such waffle products has previously required great care and has implied the risk of waffles breaking during automatic handling in filling machines with subsequent risk of interruption of operations.

15 More commonly the waffles will be made from a flat, blank item, which after baking, but before cooling, is rolled over a mandril so that the finished product assumes a cone shape.

This cone shape has a very uneven edge around the opening. This causes that the waffle appears with different dimensions which makes difficult the handling in automatic equipment for use by filling the waffles.
20

Alternatively, the waffle may be rolled over a special mandril which makes the upper edge with a symmetrical rim so that the waffle appears as a true cone.

25 Previously, magazines or dispensers for handling such waffles have been described. Typically, this takes place by placing the waffles manually in a magazine in order to avoid shocks that may result in breakage.

Alternatively, the waffles are conveyed into very long hoppers which contain very large stacks that may have a length of 2-4 metres or more. In such hoppers the load on the lowermost waffles in a stack will be very great, and therefore the risk of breakage will be very great. Furthermore, the risk of breaking waffles by shock will be very 5 large in the long hoppers, as well as in relatively small magazines. When the waffles are dropped down in a hopper or a magazine there will be a risk of breaking when a new stack of waffles is inserted and hits the uppermost waffle in a stack already situated in the hopper or magazine.

10 The known magazines further have the drawback that they are specially arranged for handling of containers in the shape of cone shaped waffles. Thus, they are not suitable for use for other kinds of containers used for foodstuffs, preferably icecream products. Thus, they will not be suitable for handling containers having form as taco-shells, containers which have shape as cups or containers with other shapes as for example 15 fan-shaped containers.

Techniques in which there are used pneumatically inflatable means for holding containers in the magazines are also known. These are, however, complicated constructions with several connections and the need for interaction of several parts for establishing a squeezing action about the containers. This creates more risks for leakage and consequently dysfunction. Furthermore, by activation the interacting means may 20 be difficult to control, especially after being used a considerable period. This implies risk of damaging the containers, if they cannot resist increased squeezing occurring as a consequence of reduced elasticity after a long period of use or at varying temperatures. These known techniques are not suitable for fragile containers, where dimensional deviations in cross-sectional dimensions may occur as for example in the case 25 of baked waffles for icecream products.

It is the purpose of the present invention to indicate a technically simple magazine 30 which is particularly suitable for use in dispensers, but which also may be used to support waffles at an arbitrary point in a high stack, and which at the same time is arranged for a gentle support of several containers situated lowermost in the stack, and

which at the same time is only a little sensitive with respect to deviations of the dimensions of the containers in the stack.

This is achieved according to the present invention with a magazine of the kind mentioned in the introduction, which is particular in that the magazine comprises fixed supporting means defining a duct for the containers, that at the circumference of the duct there is provided a single elastically resilient membrane, which can be supported by the supporting means, and which, depending on a differential pressure over the membrane, is arranged movable between a first position where it bears against the containers with a holding pressure and a second position where it allows the containers to pass freely through the duct.

According to the present invention the magazine may be used in a dispenser in a filling unit in a plant for making icecream cone products, or as a relief unit in a hopper containing very large stacks of containers.

As the elastically flexible membrane, because of the differential pressure, is moved between its two extreme positions, there may be established either a free passage for waffles through the duct of the magazine or established a holding of the waffles in the magazine because of the holding pressure exerted by the membrane on the containers. The support means define a duct with a well-defined cross section and will therefore in a technically simple way define the duct simultaneously with defining one of the extreme positions of the membrane. Therefore, it is possible to establish a well-defined holding pressure by providing the support means with suitable openings where the membrane may come into contact with the containers. By a suitable dimensioning of the elasticity of the membrane and by adjusting the magnitude of the differential pressure there may be established a holding pressure, which is sufficient for holding the containers, but which at the same time will be suitably gentle enough for not crushing the containers.

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Furthermore, the flexible membrane will be sensitive to a very small degree with respect to variations of dimensions of the containers. The magazine according to the

invention will thus be very suitable for dispensing cone shaped waffles with an uneven upper edge.

The magazine according to the invention may furthermore be used for containers with
5 different cross sectional dimensions just by adjusting the duct of the magazine according to the cross sectional dimension of the actual kind of container. The magazine may thus also be used for handling of taco-shells, fan-shaped containers, cup-shaped containers and the like. The magazine may be used for waffle products, but will also be suitable for use for supporting other kinds of containers, as for example those made of
10 cardboard, plastic, or other.

The membrane will preferably be a tubular membrane supported on internal support means which preferably are made of an internal tube with a cross diameter corresponding to the cross sectional dimension of the containers, and which is provided with a
15 number of slits. The membrane may thus be pressed in through the slits, when a differential pressure is established. The differential pressure may be established by using an external tube outside the tubular membrane and then covering the ends between the two tubes, so that a closed chamber is created between the external tube and the membrane and the closed ends.

20 As alternative for the internal tube rods or the like may also be used which support the membrane in a way which is adjusted according to the desired cross sectional dimension. At least three rods should be used. Thus four thin rods may be used placed in a rectangle if one desires to form a rectangular duct for containers with a rectangular cross sectional dimension.
25

When the differential pressure is established over the membrane, this may take place
30 either by creating an overpressure or a low pressure at one or the other side of the membrane. The differential pressure will primarily be established pneumatically. However, it may also be established as a hydraulic pressure. If an especially fast acting membrane is desired, in a special embodiment it will be possible to connect this closed chamber with a pressure source and a vacuum source via a bypass valve. Thus,

it will be possible to supply an overpressure to closed chamber in order to press the membrane into abutment on the containers in the magazine. When the containers are to be released, the valve is activated and the closed chamber is connected with the source of vacuum in order to achieve a fast evacuation, making a fast reaction possible. Hereby the magazine is suitable for dispensers where the containers are conveyed with a very great speed.

The containers are taken out of the magazine typically by using means known for the skilled for taking out the lowermost container from the stack, where the means are placed under the elastic membrane. Such means are known for example from dispensers used in icecream filling machines.

The magazine is especially suitable for use in a dispenser which is used immediately before a station for filling the containers. In such a dispenser a very high stack of containers may be supported. In order to avoid load on the lowermost containers in such a stack it will be possible to place magazines according to the invention spaced above the length of the hopper. Thus, it will be possible to reduce the height of the stack supported by waffles which are held in an actual magazine. In such an application of the magazine it may be said that it occur as a relieving unit. This relieving unit will not only reduce the weight resting on the lowermost containers in a stack, but may in addition act as a brake on the speed when a very high hopper is filled with the containers. Thus, the relieving unit may be used in hoppers for cones where hoppers may have a length of 2-4 metres.

25 The invention will be explained subsequently in more detail with reference to the accompanying schematic drawing, where

Fig. 1 shows a longitudinal section through a magazine for cone-shaped waffles,

30 Fig. 2 is a perspective view of an internal tube for the magazine in Fig. 1,
Fig. 3 is an unfolded view of the internal tube shown in Fig. 2,

Figs. 4 and 5 are cross sections through the magazine in Fig. 1 with the membrane in a first and a second extreme position, respectively,

Figs. 6 and 7 are cross sections corresponding to Figs. 4 and 5 for illustrating a second embodiment of a magazine according to the invention,

5 Fig. 8 is a perspective view of a further embodiment of the magazine according to the invention, and

Figs. 9 and 10 show cross sections corresponding to Figs. 4 and 5 through a further embodiment of a magazine according to the invention.

10 In the different figures of the drawing, identical or corresponding elements will be designated with the same reference numbers. Therefore, no specific explanation for such elements will be given in connection with each figure.

Fig. 1 is showing a longitudinal section through a magazine 1 according to the invention. The magazine 1 is arranged for handling a stack 2 of cone-shaped waffles 3 intended for subsequent filling with icecream in a filling plant (not shown). Fig. 1 thus shows the magazine 1 as a part of a dispenser which in addition comprises means 4 arranged for taking out the lowermost waffle 3 from the stack. The means for taking out the container are only illustrated schematically, as they may work according to 20 different principles.

Usually, such removing means 4 will be provided with two jaws 5 that may grip about the waffle. The jaws 5 are provided with small needles (not shown) that ensure a firm engagement with the waffle 3. The jaws 5 are arranged for pivoting about axes 6 in order to pull down the lowermost waffle 3 from the stack 2. The above lying waffles 3 in the stack will be held in the magazine itself in the shown embodiment.

Alternatively, there may be provided separate holding means supporting the edge of the waffle 3 second to the bottom in the stack. However, the removing means 4 are guided in vertically reciprocally moving means, as for example via a guide way. Here the vertical stroke of the removing means 4 may be arranged so that the waffle second to the bottom will be held in the magazine itself, as it will be explained in the follow-

ing. Thus, it becomes possible to simplify the design of the removing means 4 and at the same time to achieve a gentle handling of the waffles as fewer mechanical engagements with the waffles occur.

5 The magazine 1 comprises a membrane 7 placed externally on an internal tube 8. Furthermore, the magazine comprises an external tube 9 having a greater diameter than the membrane 7. At the upper end 10 and the lower end 11 of the tubes 8,9 there are provided covers (not shown), so that a closed chamber 12 is formed between the membrane 8 and the external tube 9. The external tube 9 is provided with a pipe stub 13. The pipe stub 13 is connected with a bypass valve 14 which may connect the chamber 12 with a pressure source 15 or a vacuum source 16.

10 In Figs. 2 and 3 there are illustrated a perspective view and an unfolded view, respectively, of the internal tube 8. It is seen, that the internal tube is provided a number of slits 17. The slits 17 extend in the longitudinal direction of the internal tube 8. In the 15 shown embodiment the slits extend over half of the height of the tube, and the slits are mutually staggered at each half of the tube. This embodiment is established for reasons of strength.

20 Alternatively, it will be possible to let the slits 17 extend mainly over all the length of the internal tube 8. It will also be possible to provide a smaller or greater number of slits. Out of consideration to a symmetrical action about the waffles it is preferred to have at least two slits 17 placed symmetrically about circumference of the tube. With the purpose of an effective holding a large number of slits is not desired. Therefore, 25 three slits are preferred in a magazine 1 for waffles 3.

The magazine 1 functions in the following way, as explained with reference to Figs. 4 and 5. The membrane 7 is an elastically resilient rubber membrane which will be placed with its own elasticity about the internal tube 8 in its neutral position, where 30 equal pressures occur on both sides of the membrane 7. When an overpressure is applied to the chamber 12 through the pipe stub 13 the parts 18 of the membrane opposite the slits 17 are pressed inwards through the slits because of the differential pres-

sure, acting on the first side 28 of the membrane, i.e. the outer side. The parts 18 of the membrane are therefore moved to a position where they abuts on the waffles 3 with a holding pressure. The waffles 3 are thus held in a gentle way by the engagement with the second side 30, the inner side, of the parts 18 of the membrane of the elastic membrane 7. When the differential pressure ceases to exist by removing the pressure in the chamber 12 the membrane may move from the first position shown in Fig. 5 where an engagement with a waffle 3 exists to the second position shown in Fig. 4 where within the membrane 8 there is formed a duct 19 (in principle all of the inner space in the internal tube 8) for the free passage of the waffles.

10

The displacement of the membrane 7 between a first and a second position will be performed cyclically and coordinated with the movement of the removing means 4. When the removing means 4 are in their upper position the membrane is moved to the second position shown in Fig. 4. Hereafter the whole stack 2 may be displaced a small distance downwards, so that the lower waffle 3 in the stack is moved to a position immediately under a lower edge 20 of the lowermost slits 17. Hereafter a differential pressure is supplied, displacing the membrane to the first position illustrated in Fig. 5. Hereby all the waffles 3 are held firmly, except the lowermost waffle 3. Hereafter the continued downward movement of the removing means 4 may remove the lowermost waffle 3 from the stack. By pivoting the jaws 5 of the removing means the waffle is released to a conveyor or the like (not shown) which is placed below the removing means 4.

In Figs. 6 and 7 there are illustrated two cross sections corresponding to Figs. 4 and 5. 25 This embodiment of a magazine 21, which is shown in Figs. 6 and 7, functions in the same way as explained above with reference to Figs. 4 and 5. The magazine 21 is arranged for handling containers with a mainly four-sided cross section. The magazine 21 is thus arranged for handling taco-shells or fan-shaped waffles for use in icecream products or other food products.

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In Fig. 8 there is illustrated a further embodiment of a magazine 22 according to invention. This magazine is in principle built up in two sections, an upper section 23 and

a lower section 24. Each of the sections 23,24 in principle corresponds to a magazine 1. The division occurs by placing a partitioning wall 25 so that two closed chambers 12 are formed between the membrane 7 (not shown) and the external tube 9. The magazine is divided into two sections working in mutually opposite cycles, i.e. that 5 the membrane will be placed in a first position in the first section and in a second position in the second section and reversely. Hereby a more gentle handling of the waffles 3 is achieved. Thus, there will be a lesser sensitivity to shocks when a stack of waffles 2 is placed in the magazine 22. Thus a stack of waffles inserted in the hopper or directly in the magazine will always hit waffles supported by the membrane 7. 10 There will never be a risk that a stack is inserted into the magazine in a situation where the stack of waffles alone is supported by the jaws 5. Such a situation is undesirable, as here there will be the greatest risk of breakage of the waffles.

Fig. 9 shows a cross section through a further embodiment of a magazine 29 according 15 to the invention. Instead of an internal tube, in this magazine there is provided rods 26 defining the duct 19 and supporting the membrane 7. The rods 26 may be round rods or may be partly circular plate sections. The rods 26 should be provided in a number of at least three and are placed so that the a straight line between two rods cuts off a chord of the waffle 3. Because of its own elasticity the membrane will hereby abut for 20 holding the waffle by means of the membrane parts 27 corresponding to the part of the waffle 3, which will be cut off by the said chord.

If a vacuum is supplied at the first side 28 of the membrane facing the chamber 12, the 25 membrane will move to its second position shown in Fig. 10, which allows a free passage of the waffles 3 through the formed duct 19.

This arrangement of the magazine 29, which is shown in Figs. 9 and 10, differs from the previously shown embodiments. The above described embodiments were thus arranged so that an overpressure at the first side 28 of the membrane caused it to move 30 to its first position where the second side 30 of the membrane abuts on and holds the waffles 3.

It depends on the conditions of application whether an overpressure or a low pressure is used to bring the membrane to its position for engagement with the waffles 3 or whether the self elasticity of the membrane 7 is used for establishing the holding pressure.

CLAIMS

1. A magazine for a dispenser for crisp and fragile containers, for example cones for an icecream product, the dispenser comprising the magazine arranged for supporting a stack of containers as well as means for taking out the lowermost container from the stack and inflatable means for supporting the other containers, **c h a r a c t e r i s e d** in that the magazine comprises fixed supporting means defining a duct for the containers, that at the circumference of the duct there is provided a single elastically resilient membrane, which can be supported by the supporting means, and which, depending on a differential pressure over the membrane, is arranged movable between a first position where it bears against the containers with a holding pressure and a second position where it allows the containers to pass freely through the duct.
2. A magazine according to claim 1, **c h a r a c t e r i s e d** in that the membrane is tubular and supported on internal supports that allow free passage of the containers when the membrane is in its second position.
3. A magazine according to claim 2, **c h a r a c t e r i s e d** in that the support means comprise a first tube with a diameter slightly greater than the cross-dimension of the containers and which has a circumference approximately corresponding to the circumference of the tubular membrane, and that the tube has slits which are covered by the membrane.
4. A magazine according to claim 3, **c h a r a c t e r i s e d** in that a second tube with larger diameter surrounds the first tube, and that the interspace between these is closed at the ends so that a closed chamber is formed.
5. A magazine according to any preceding claim, **c h a r a c t e r i s e d** in that the differential pressure is established pneumatically either by creating an overpressure or low pressure at one or the other side of the membrane.

6. A magazine according to any preceding claim, characterised in that the membrane is arranged so that an overpressure at a first side of the membrane causes it to move to its first position in which its second side bears against and holds the containers, and that removal of the overpressure causes the membrane to move to its second position as it assumes its neutral position where the containers may pass freely through the duct.

5

7. A magazine according to any of the claims 1 - 5, characterised in that the membrane is arranged so that a low pressure at a first side of the membrane causes it to move to its second position where the container freely may pass through the duct, and that removal of the low pressure causes the membrane to move to its first position where the containers are held by the second side of the membrane by the self-elasticity of the membrane.

10

15 8. A magazine according to any of the previous claims, characterised in that the duct is defined within at least three elongated support means and that between these are free spaces where three subareas of a circular tubular membrane may abut on the containers.

20 9. Use of a magazine according to any preceding claim in a dispenser in a filling unit in a plant for producing icecream cone products.

10. Use of a magazine according to any of the claims 1-8 as a relief unit in a hopper containing very large stacks of containers.

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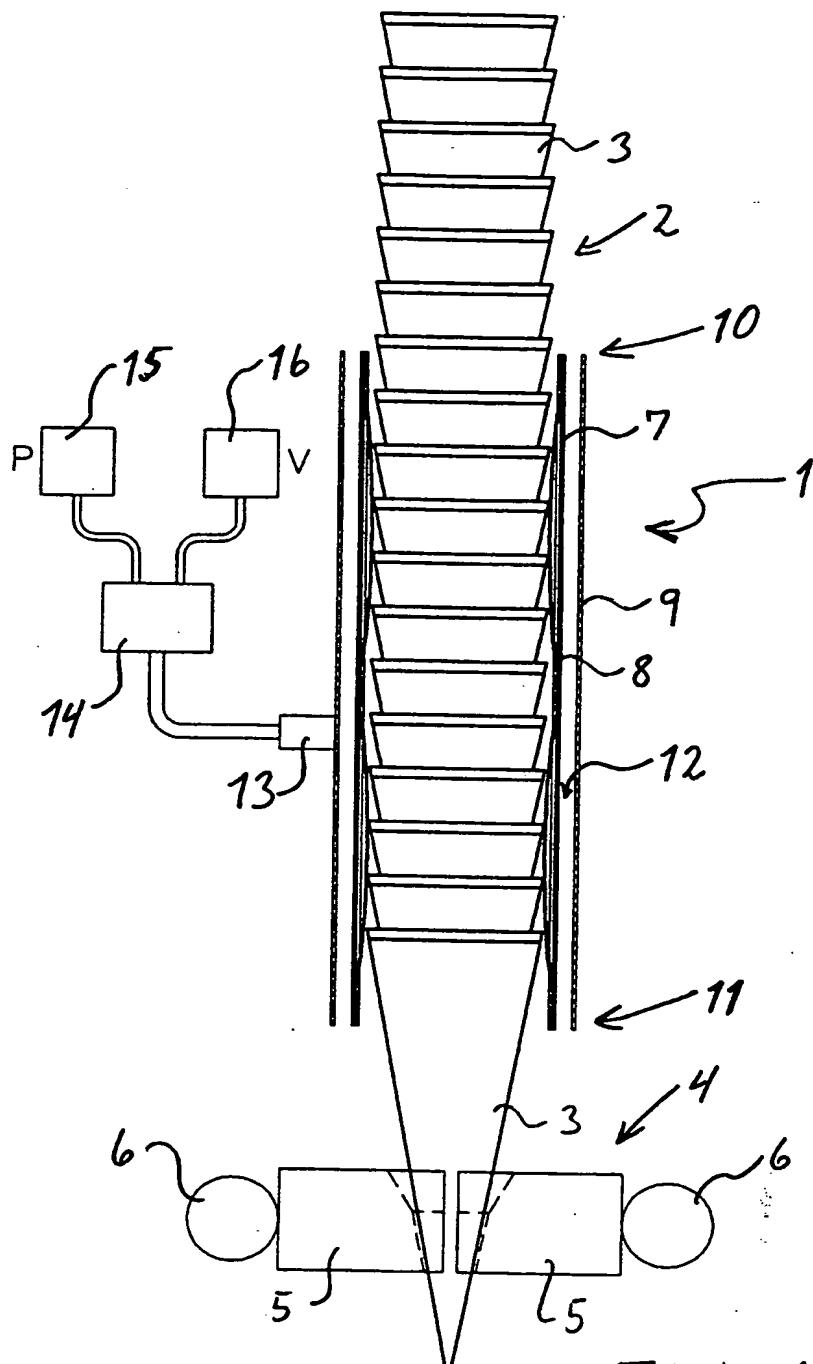


FIG. 1

2 / 5

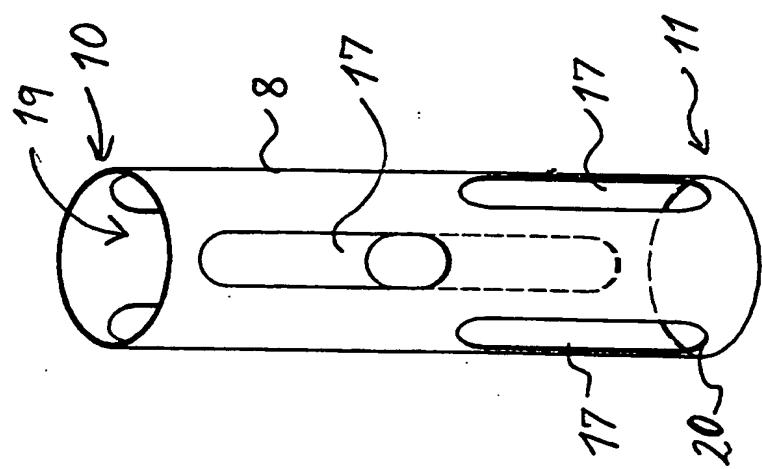


FIG. 2

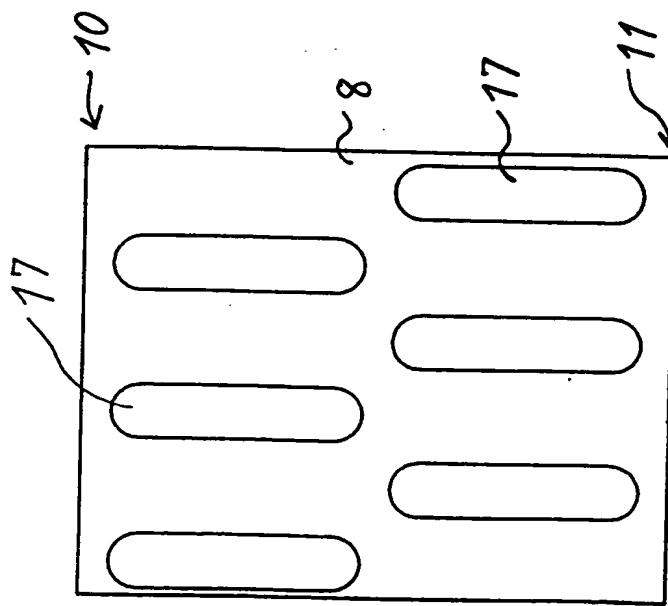


FIG. 3

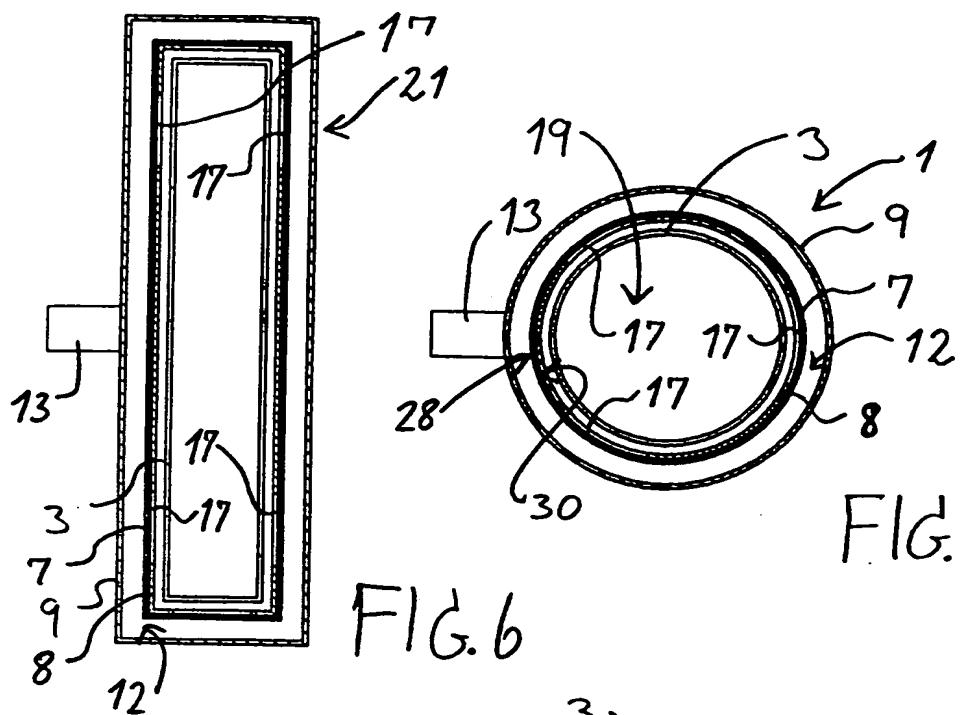


FIG. 4

FIG. 6

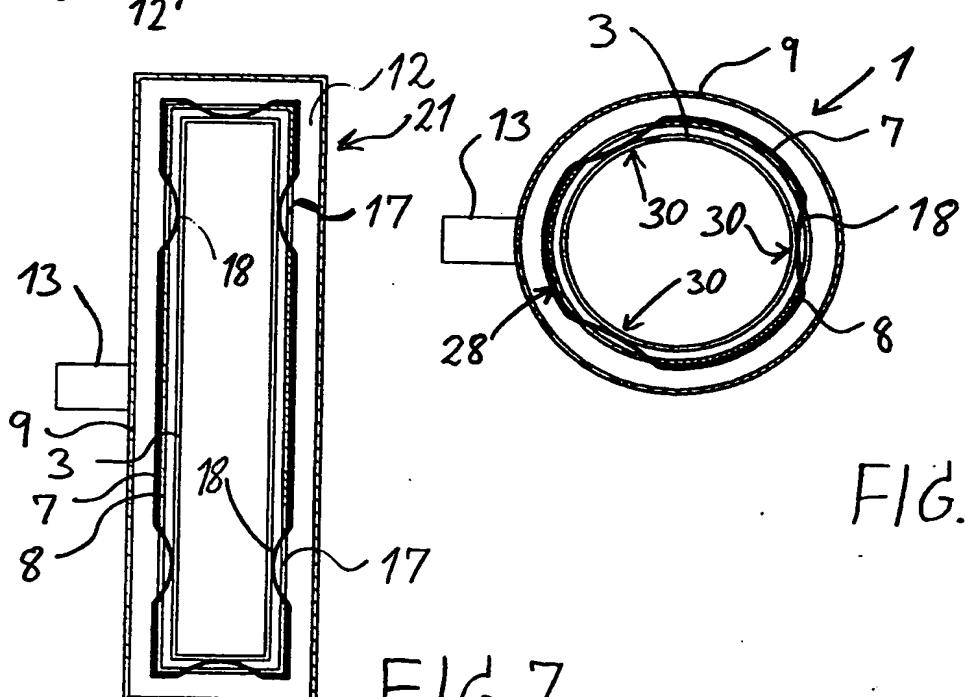


FIG. 5

FIG. 7

4 / 5

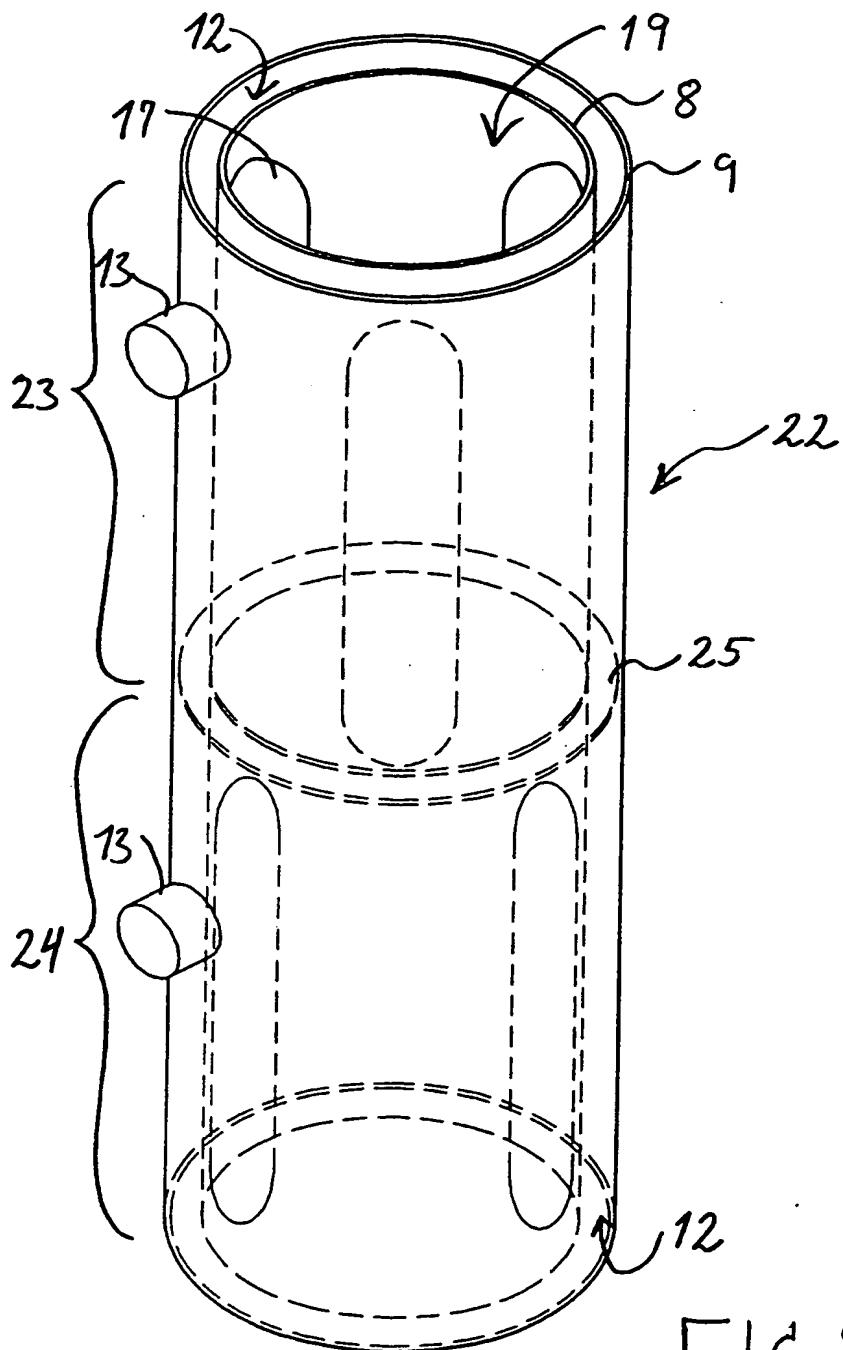


FIG. 8

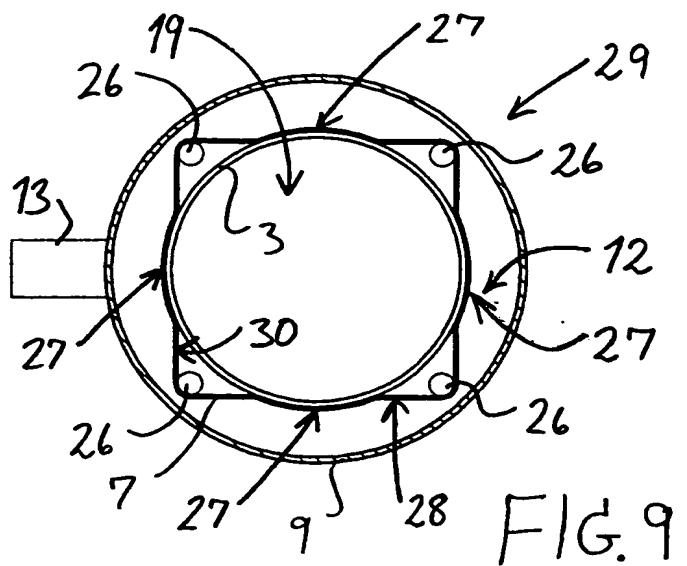


FIG. 9

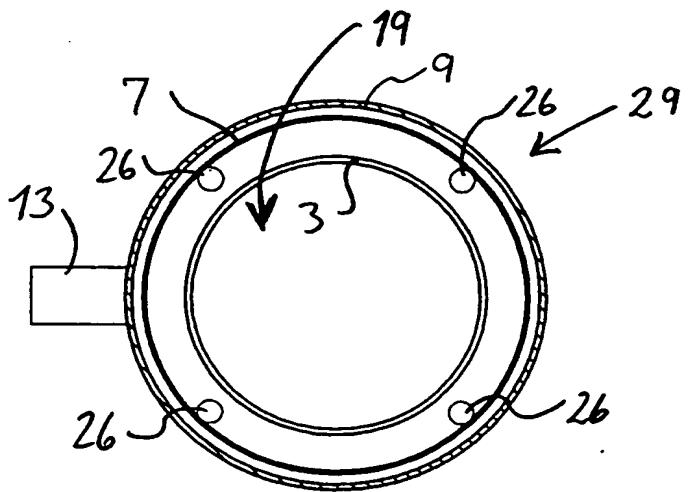


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No. PCT/DK 99/00100
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A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A47F 1/08, B65B 43/44, B65G 59/10, B25J 15/06
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A47F, B25J, B65B, B65G, G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Patent Abstracts of Japan, abstract of JP 10-29726 A (TANAKA SYST KK), 3 February 1998 (03.02.98) --	1,2,5
A	US 5325993 A (COOPER, III), 5 July 1994 (05.07.94) --	1-5
A	DE 3721188 A1 (ITO, SADAHARU), 14 January 1988 (14.01.88), column 5, line 18 - line 20, figures 7, 8 --	1-5
A	US 2232425 A (J. BALTON), 18 February 1941 (18.02.41) --	1-5

Further documents are listed in the continuation of Box C.

See patent family annex.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT
Information on patent family members

01/06/99

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US 2232425 A	18/02/41	NONE	
US 4364491 A	21/12/82	NONE	



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<p>(21) International Application Number: PCT/DK99/00100</p> <p>(22) International Filing Date: 3 March 1999 (03.03.99)</p> <p>(30) Priority Data: 0294/98 4 March 1998 (04.03.98) DK</p> <p>(71) Applicant (<i>for all designated States except US</i>): GRAM A/S [DK/DK]; Aage Grams Vej 1, DK-6500 Vojens (DK).</p> <p>(72) Inventor; and (75) Inventor/Applicant (<i>for US only</i>): SIMONSEN, Kaj [DK/DK]; Præstevænget 8, DK-6500 Vojens (DK).</p> <p>(74) Agent: PATRADE A/S; Store Torv 1, DK-8000 Aarhus C (DK).</p>		<p>(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
<p>(54) Title: A MAGAZINE FOR A DISPENSER FOR CRISP AND FRAGILE CONTAINERS AND USES OF SUCH A MAGAZINE</p> <p>(57) Abstract</p> <p>A magazine (1) is described for careful handling of waffles (3). The magazine comprises a duct on the waffles (3), which are placed within an elastically resilient membrane (7). The membrane (7) is situated on an internal tube (8) provided with slits (17). Outside an external tube (9) is provided. By supplying pressure to a closed chamber (12) between the external tube (9) and the membrane (7) the membrane is displaced from a first position, where it holds the waffles in a gentle way, to a second position, where it allows the free passage of the waffles through the internal tube (8).</p> <p>The top diagram shows a side view of the magazine (1) with various components labeled: 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30. It includes a pump system with valves P and V connected to chambers 12 and 13. The bottom left diagram is a cross-section of the internal tube (8) showing the membrane (7) with slits (17) and the external tube (9). The bottom right diagram is another cross-section showing the internal tube (8) with the membrane (7) and the external tube (9).</p>		

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A MAGAZINE FOR A DISPENSER FOR CRISP AND FRAGILE CONTAINERS AND USES OF SUCH A MAGAZINE

The present invention relates to a magazine for a dispenser for crisp and fragile containers, for example cones for an icecream product, the dispenser comprising the magazine arranged for supporting a stack of containers as well as means for taking out the lowermost container from the stack and inflatable means for supporting the other containers. Furthermore, the invention concerns specific uses of the magazine according to the invention.

The present invention has appeared in connection with handling of so-called cones, which are crisp, fragile, cone-shaped waffles in icecream cornet products. The handling of such waffle products has previously required great care and has implied the risk of waffles breaking during automatic handling in filling machines with subsequent risk of interruption of operations.

More commonly the waffles will be made from a flat, blank item, which after baking, but before cooling, is rolled over a mandril so that the finished product assumes a cone shape.

This cone shape has a very uneven edge around the opening. This causes that the waffle appears with different dimensions which makes difficult the handling in automatic equipment for use by filling the waffles.

Alternatively, the waffle may be rolled over a special mandril which makes the upper edge with a symmetrical rim so that the waffle appears as a true cone.

Previously, magazines or dispensers for handling such waffles have been described. Typically, this takes place by placing the waffles manually in a magazine in order to avoid shocks that may result in breakage.

Alternatively, the waffles are conveyed into very long hoppers which contain very large stacks that may have a length of 2-4 metres or more. In such hoppers the load on the lowermost waffles in a stack will be very great, and therefore the risk of breakage will be very great. Furthermore, the risk of breaking waffles by shock will be very large in the long hoppers, as well as in relatively small magazines. When the waffles are dropped down in a hopper or a magazine there will be a risk of breaking when a new stack of waffles is inserted and hits the uppermost waffle in a stack already situated in the hopper or magazine.

10 The known magazines further have the drawback that they are specially arranged for handling of containers in the shape of cone shaped waffles. Thus, they are not suitable for use for other kinds of containers used for foodstuffs, preferably icecream products. Thus, they will not be suitable for handling containers having form as taco-shells, containers which have shape as cups or containers with other shapes as for example 15 fan-shaped containers.

Techniques in which there are used pneumatically inflatable means for holding containers in the magazines are also known. These are, however, complicated constructions with several connections and the need for interaction of several parts for establishing a squeezing action about the containers. This creates more risks for leakage and consequently dysfunction. Furthermore, by activation the interacting means may be difficult to control, especially after being used a considerable period. This implies risk of damaging the containers, if they cannot resist increased squeezing occurring as a consequence of reduced elasticity after a long period of use or at varying temperatures. These known techniques are not suitable for fragile containers, where dimensional deviations in cross-sectional dimensions may occur as for example in the case 25 of baked waffles for icecream products.

It is the purpose of the present invention to indicate a technically simple magazine 30 which is particularly suitable for use in dispensers, but which also may be used to support waffles at an arbitrary point in a high stack, and which at the same time is arranged for a gentle support of several containers situated lowermost in the stack, and

which at the same time is only a little sensitive with respect to deviations of the dimensions of the containers in the stack.

This is achieved according to the present invention with a magazine of the kind mentioned in the introduction, which is particular in that the magazine comprises fixed supporting means defining a duct for the containers, that at the circumference of the duct there is provided a single elastically resilient membrane, which can be supported by the supporting means, and which, depending on a differential pressure over the membrane, is arranged movable between a first position where it bears against the containers with a holding pressure and a second position where it allows the containers to pass freely through the duct.

According to the present invention the magazine may be used in a dispenser in a filling unit in a plant for making icecream cone products, or as a relief unit in a hopper containing very large stacks of containers.

As the elastically flexible membrane, because of the differential pressure, is moved between its two extreme positions, there may be established either a free passage for waffles through the duct of the magazine or established a holding of the waffles in the magazine because of the holding pressure exerted by the membrane on the containers. The support means define a duct with a well-defined cross section and will therefore in a technically simple way define the duct simultaneously with defining one of the extreme positions of the membrane. Therefore, it is possible to establish a well-defined holding pressure by providing the support means with suitable openings where the membrane may come into contact with the containers. By a suitable dimensioning of the elasticity of the membrane and by adjusting the magnitude of the differential pressure there may be established a holding pressure, which is sufficient for holding the containers, but which at the same time will be suitably gentle enough for not crushing the containers.

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Furthermore, the flexible membrane will be sensitive to a very small degree with respect to variations of dimensions of the containers. The magazine according to the

invention will thus be very suitable for dispensing cone shaped waffles with an uneven upper edge.

The magazine according to the invention may furthermore be used for containers with
5 different cross sectional dimensions just by adjusting the duct of the magazine according to the cross sectional dimension of the actual kind of container. The magazine may thus also be used for handling of taco-shells, fan-shaped containers, cup-shaped containers and the like. The magazine may be used for waffle products, but will also be suitable for use for supporting other kinds of containers, as for example those made of
10 cardboard, plastic, or other.

The membrane will preferably be a tubular membrane supported on internal support means which preferably are made of an internal tube with a cross diameter corresponding to the cross sectional dimension of the containers, and which is provided with a
15 number of slits. The membrane may thus be pressed in through the slits, when a differential pressure is established. The differential pressure may be established by using an external tube outside the tubular membrane and then covering the ends between the two tubes, so that a closed chamber is created between the external tube and the membrane and the closed ends.
20

As alternative for the internal tube rods or the like may also be used which support the membrane in a way which is adjusted according to the desired cross sectional dimension. At least three rods should be used. Thus four thin rods may be used placed in a rectangle if one desires to form a rectangular duct for containers with a rectangular
25 cross sectional dimension.

When the differential pressure is established over the membrane, this may take place either by creating an overpressure or a low pressure at one or the other side of the membrane. The differential pressure will primarily be established pneumatically.
30 However, it may also be established as a hydraulic pressure. If an especially fast acting membrane is desired, in a special embodiment it will be possible to connect this closed chamber with a pressure source and a vacuum source via a bypass valve. Thus,

it will be possible to supply an overpressure to closed chamber in order to press the membrane into abutment on the containers in the magazine. When the containers are to be released, the valve is activated and the closed chamber is connected with the source of vacuum in order to achieve a fast evacuation, making a fast reaction possible. Hereby the magazine is suitable for dispensers where the containers are conveyed with a very great speed.

The containers are taken out of the magazine typically by using means known for the skilled for taking out the lowermost container from the stack, where the means are placed under the elastic membrane. Such means are known for example from dispensers used in icecream filling machines.

The magazine is especially suitable for use in a dispenser which is used immediately before a station for filling the containers. In such a dispenser a very high stack of containers may be supported. In order to avoid load on the lowermost containers in such a stack it will be possible to place magazines according to the invention spaced above the length of the hopper. Thus, it will be possible to reduce the height of the stack supported by waffles which are held in an actual magazine. In such an application of the magazine it may be said that it occur as a relieving unit. This relieving unit will not only reduce the weight resting on the lowermost containers in a stack, but may in addition act as a brake on the speed when a very high hopper is filled with the containers. Thus, the relieving unit may be used in hoppers for cones where hoppers may have a length of 2-4 metres.

The invention will be explained subsequently in more detail with reference to the accompanying schematic drawing, where

Fig. 1 shows a longitudinal section through a magazine for cone-shaped waffles,

Fig. 2 is a perspective view of an internal tube for the magazine in Fig. 1,
Fig. 3 is an unfolded view of the internal tube shown in Fig. 2,

Figs. 4 and 5 are cross sections through the magazine in Fig. 1 with the membrane in a first and a second extreme position, respectively,

Figs. 6 and 7 are cross sections corresponding to Figs. 4 and 5 for illustrating a second embodiment of a magazine according to the invention,

5 Fig. 8 is a perspective view of a further embodiment of the magazine according to the invention, and

Figs. 9 and 10 show cross sections corresponding to Figs. 4 and 5 through a further embodiment of a magazine according to the invention.

10 In the different figures of the drawing, identical or corresponding elements will be designated with the same reference numbers. Therefore, no specific explanation for such elements will be given in connection with each figure.

Fig. 1 is showing a longitudinal section through a magazine 1 according to the invention. The magazine 1 is arranged for handling a stack 2 of cone-shaped waffles 3 intended for subsequent filling with icecream in a filling plant (not shown). Fig. 1 thus shows the magazine 1 as a part of a dispenser which in addition comprises means 4 arranged for taking out the lowermost waffle 3 from the stack. The means for taking out the container are only illustrated schematically, as they may work according to 20 different principles.

Usually, such removing means 4 will be provided with two jaws 5 that may grip about the waffle. The jaws 5 are provided with small needles (not shown) that ensure a firm engagement with the waffle 3. The jaws 5 are arranged for pivoting about axes 6 in order to pull down the lowermost waffle 3 from the stack 2. The above lying waffles 3 in the stack will be held in the magazine itself in the shown embodiment.

Alternatively, there may be provided separate holding means supporting the edge of the waffle 3 second to the bottom in the stack. However, the removing means 4 are guided in vertically reciprocally moving means, as for example via a guide way. Here the vertical stroke of the removing means 4 may be arranged so that the waffle second to the bottom will be held in the magazine itself, as it will be explained in the follow-

ing. Thus, it becomes possible to simplify the design of the removing means 4 and at the same time to achieve a gentle handling of the waffles as fewer mechanical engagements with the waffles occur.

5 The magazine 1 comprises a membrane 7 placed externally on an internal tube 8. Furthermore, the magazine comprises an external tube 9 having a greater diameter than the membrane 7. At the upper end 10 and the lower end 11 of the tubes 8,9 there are provided covers (not shown), so that a closed chamber 12 is formed between the membrane 8 and the external tube 9. The external tube 9 is provided with a pipe stub 13. The pipe stub 13 is connected with a bypass valve 14 which may connect the chamber 12 with a pressure source 15 or a vacuum source 16.

10 In Figs. 2 and 3 there are illustrated a perspective view and an unfolded view, respectively, of the internal tube 8. It is seen, that the internal tube is provided a number of slits 17. The slits 17 extend in the longitudinal direction of the internal tube 8. In the 15 shown embodiment the slits extend over half of the height of the tube, and the slits are mutually staggered at each half of the tube. This embodiment is established for reasons of strength.

20 Alternatively, it will be possible to let the slits 17 extend mainly over all the length of the internal tube 8. It will also be possible to provide a smaller or greater number of slits. Out of consideration to a symmetrical action about the waffles it is preferred to have at least two slits 17 placed symmetrically about circumference of the tube. With the purpose of an effective holding a large number of slits is not desired. Therefore, 25 three slits are preferred in a magazine 1 for waffles 3.

30 The magazine 1 functions in the following way, as explained with reference to Figs. 4 and 5. The membrane 7 is an elastically resilient rubber membrane which will be placed with its own elasticity about the internal tube 8 in its neutral position, where equal pressures occur on both sides of the membrane 7. When an overpressure is applied to the chamber 12 through the pipe stub 13 the parts 18 of the membrane opposite the slits 17 are pressed inwards through the slits because of the differential pres-

sure, acting on the first side 28 of the membrane, i.e. the outer side. The parts 18 of the membrane are therefore moved to a position where they abuts on the waffles 3 with a holding pressure. The waffles 3 are thus held in a gentle way by the engagement with the second side 30, the inner side, of the parts 18 of the membrane of the elastic membrane 7. When the differential pressure ceases to exist by removing the pressure in the chamber 12 the membrane may move from the first position shown in Fig. 5 where an engagement with a waffle 3 exists to the second position shown in Fig. 4 where within the membrane 8 there is formed a duct 19 (in principle all of the inner space in the internal tube 8) for the free passage of the waffles.

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The displacement of the membrane 7 between a first and a second position will be performed cyclically and coordinated with the movement of the removing means 4. When the removing means 4 are in their upper position the membrane is moved to the second position shown in Fig. 4. Hereafter the whole stack 2 may be displaced a small distance downwards, so that the lower waffle 3 in the stack is moved to a position immediately under a lower edge 20 of the lowermost slits 17. Hereafter a differential pressure is supplied, displacing the membrane to the first position illustrated in Fig. 5. Hereby all the waffles 3 are held firmly, except the lowermost waffle 3. Hereafter the continued downward movement of the removing means 4 may remove the lowermost waffle 3 from the stack. By pivoting the jaws 5 of the removing means the waffle is released to a conveyor or the like (not shown) which is placed below the removing means 4.

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In Figs. 6 and 7 there are illustrated two cross sections corresponding to Figs. 4 and 5. This embodiment of a magazine 21, which is shown in Figs. 6 and 7, functions in the same way as explained above with reference to Figs. 4 and 5. The magazine 21 is arranged for handling containers with a mainly four-sided cross section. The magazine 21 is thus arranged for handling taco-shells or fan-shaped waffles for use in icecream products or other food products.

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In Fig. 8 there is illustrated a further embodiment of a magazine 22 according to invention. This magazine is in principle built up in two sections, an upper section 23 and

a lower section 24. Each of the sections 23,24 in principle corresponds to a magazine 1. The division occurs by placing a partitioning wall 25 so that two closed chambers 12 are formed between the membrane 7 (not shown) and the external tube 9. The magazine is divided into two sections working in mutually opposite cycles, i.e. that 5 the membrane will be placed in a first position in the first section and in a second position in the second section and reversely. Hereby a more gentle handling of the waffles 3 is achieved. Thus, there will be a lesser sensitivity to shocks when a stack of waffles 2 is placed in the magazine 22. Thus a stack of waffles inserted in the hopper or directly in the magazine will always hit waffles supported by the membrane 7. 10 There will never be a risk that a stack is inserted into the magazine in a situation where the stack of waffles alone is supported by the jaws 5. Such a situation is undesirable, as here there will be the greatest risk of breakage of the waffles.

Fig. 9 shows a cross section through a further embodiment of a magazine 29 according 15 to the invention. Instead of an internal tube, in this magazine there is provided rods 26 defining the duct 19 and supporting the membrane 7. The rods 26 may be round rods or may be partly circular plate sections. The rods 26 should be provided in a number of at least three and are placed so that the a straight line between two rods cuts off a chord of the waffle 3. Because of its own elasticity the membrane will hereby abut for 20 holding the waffle by means of the membrane parts 27 corresponding to the part of the waffle 3, which will be cut off by the said chord.

If a vacuum is supplied at the first side 28 of the membrane facing the chamber 12, the 25 membrane will move to its second position shown in Fig. 10, which allows a free passage of the waffles 3 through the formed duct 19.

This arrangement of the magazine 29, which is shown in Figs. 9 and 10, differs from the previously shown embodiments. The above described embodiments were thus arranged so that an overpressure at the first side 28 of the membrane caused it to move 30 to its first position where the second side 30 of the membrane abuts on and holds the waffles 3.

It depends on the conditions of application whether an overpressure or a low pressure is used to bring the membrane to its position for engagement with the waffles 3 or whether the self elasticity of the membrane 7 is used for establishing the holding pressure.

CLAIMS

1. A magazine for a dispenser for crisp and fragile containers, for example cones for an icecream product, the dispenser comprising the magazine arranged for supporting a stack of containers as well as means for taking out the lowermost container from the stack and inflatable means for supporting the other containers, **c h a r a c t e r i s e d** in that the magazine comprises fixed supporting means defining a duct for the containers, that at the circumference of the duct there is provided a single elastically resilient membrane, which can be supported by the supporting means, and which, depending on a differential pressure over the membrane, is arranged movable between a first position where it bears against the containers with a holding pressure and a second position where it allows the containers to pass freely through the duct.
2. A magazine according to claim 1, **c h a r a c t e r i s e d** in that the membrane is tubular and supported on internal supports that allow free passage of the containers when the membrane is in its second position.
3. A magazine according to claim 2, **c h a r a c t e r i s e d** in that the support means comprise a first tube with a diameter slightly greater than the cross-dimension of the containers and which has a circumference approximately corresponding to the circumference of the tubular membrane, and that the tube has slits which are covered by the membrane.
4. A magazine according to claim 3, **c h a r a c t e r i s e d** in that a second tube with larger diameter surrounds the first tube, and that the interspace between these is closed at the ends so that a closed chamber is formed.
5. A magazine according to any preceding claim, **c h a r a c t e r i s e d** in that the differential pressure is established pneumatically either by creating an overpressure or low pressure at one or the other side of the membrane.

6. A magazine according to any preceding claim, characterised in that the membrane is arranged so that an overpressure at a first side of the membrane causes it to move to its first position in which its second side bears against and holds the containers, and that removal of the overpressure causes the membrane to move to its second position as it assumes its neutral position where the containers may pass freely through the duct.

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7. A magazine according to any of the claims 1 - 5, characterised in that the membrane is arranged so that a low pressure at a first side of the membrane causes it to move to its second position where the container freely may pass through the duct, and that removal of the low pressure causes the membrane to move to its first position where the containers are held by the second side of the membrane by the self-elasticity of the membrane.

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15 8. A magazine according to any of the previous claims, characterised in that the duct is defined within at least three elongated support means and that between these are free spaces where three subareas of a circular tubular membrane may abut on the containers.

20 9. Use of a magazine according to any preceding claim in a dispenser in a filling unit in a plant for producing icecream cone products.

10. Use of a magazine according to any of the claims 1-8 as a relief unit in a hopper containing very large stacks of containers.

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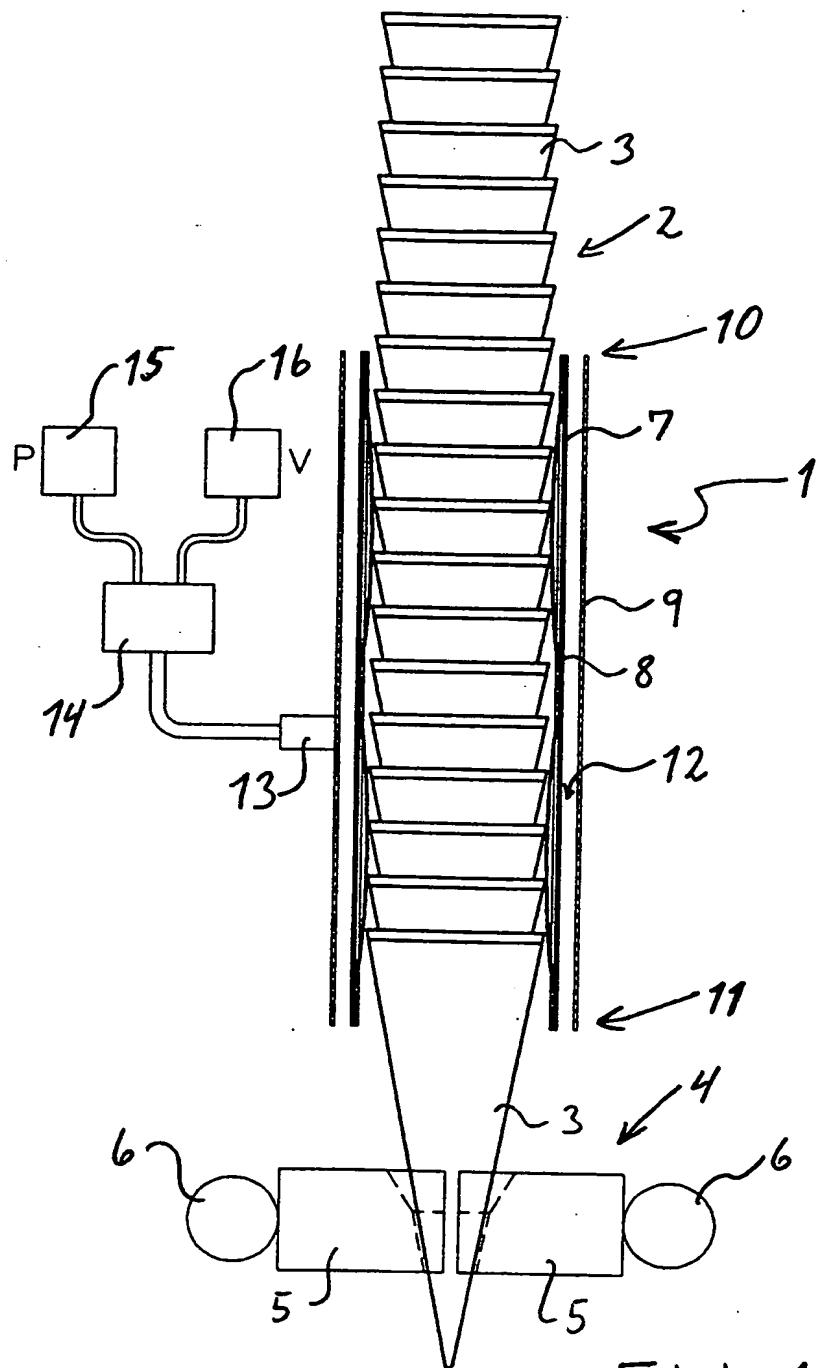


FIG. 1

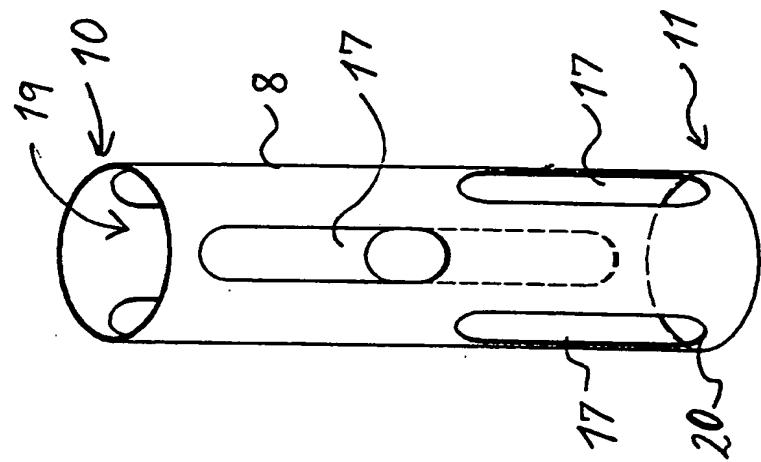


Fig. 2

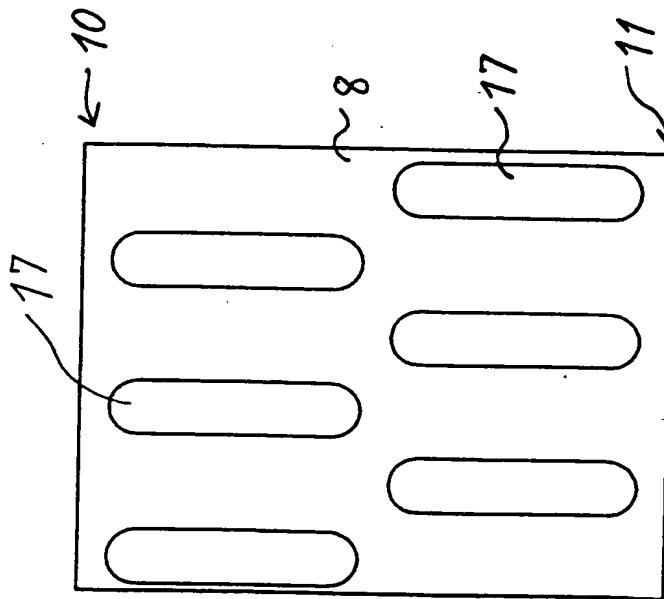


Fig. 3

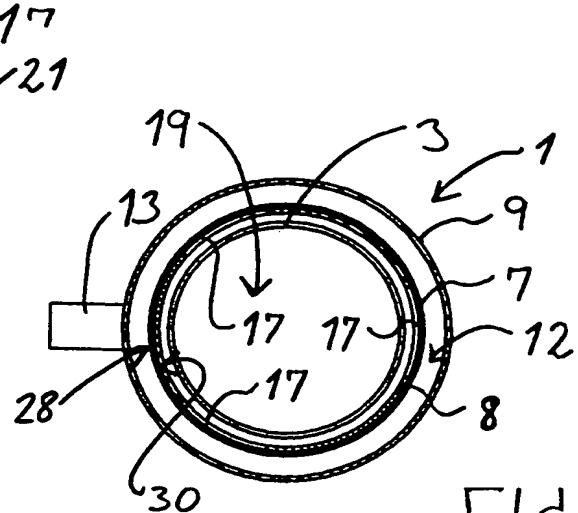
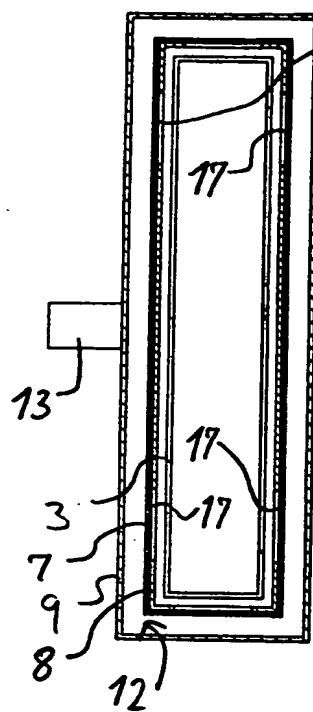


FIG. 4

FIG. 6

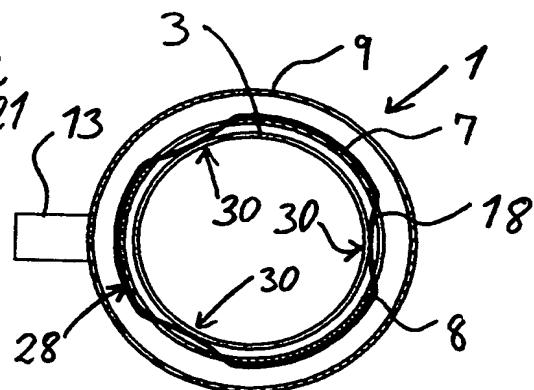
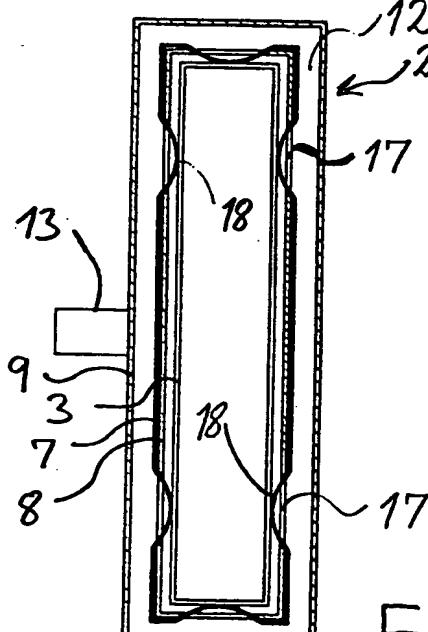


FIG. 5

FIG. 7

4 / 5

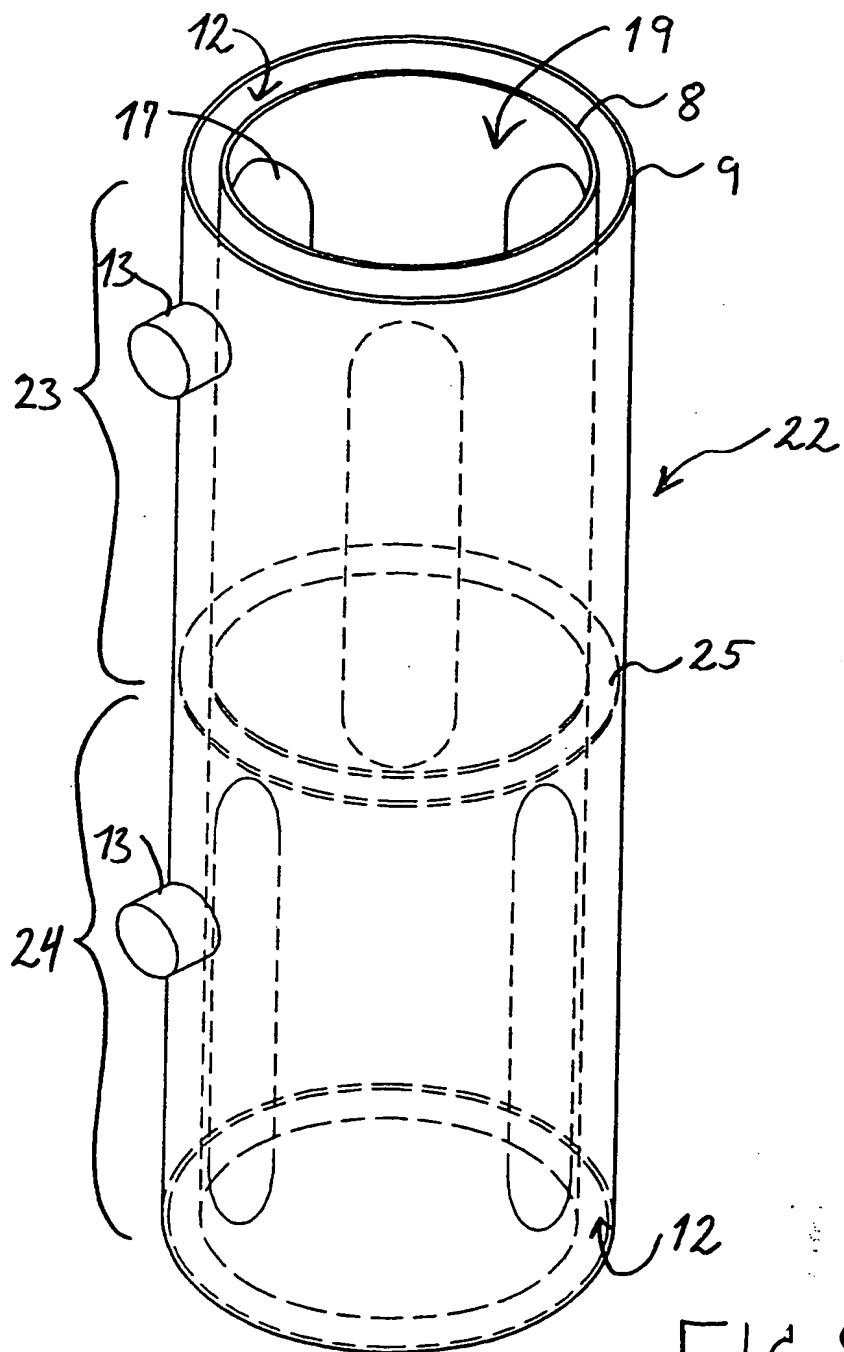
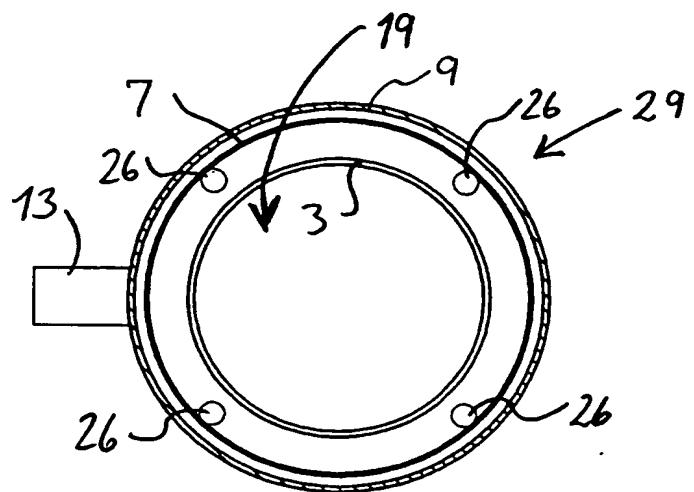
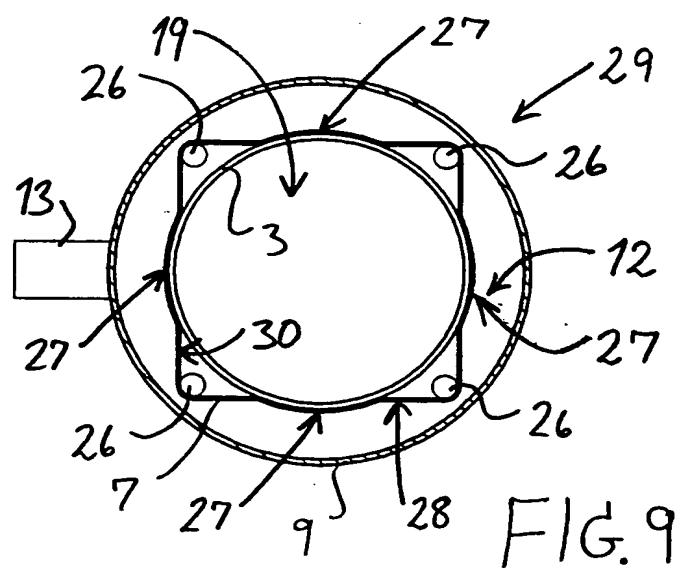


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No. PCT/DK 99/00100
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A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A47F 1/08, B65B 43/44, B65G 59/10, B25J 15/06
 According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A47F, B25J, B65B, B65G, G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Patent Abstracts of Japan, abstract of JP 10-29726 A (TANAKA SYST KK), 3 February 1998 (03.02.98) --	1,2,5
A	US 5325993 A (COOPER, III), 5 July 1994 (05.07.94) --	1-5
A	DE 3721188 A1 (ITO, SADAHARU), 14 January 1988 (14.01.88), column 5, line 18 - line 20, figures 7, 8 --	1-5
A	US 2232425 A (J. BALTON), 18 February 1941 (18.02.41) --	1-5

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A	US 4364491 A (ADAMSON), 21 December 1982 (21.12.82) -- -----	1-5

INTERNATIONAL SEARCH REPORT

Information on patent family members

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